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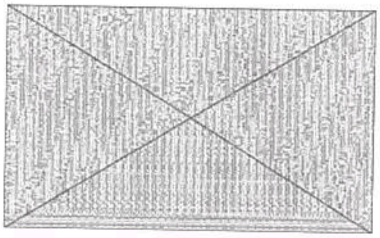
From: Mary Rosenthal
Sent: Tue 7/23/2013 5:38:43 PM
Subject: ABO Webinar: Beneficially Reusing Carbon Emissions with Algae



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ABO Webinar:

CO_2 and Commercial Algae Production

Please join us on
July 25, 2013 at 2pm ET (11am PT)

Can we put carbon emissions to good use? Next week the Algae Biomass Organization's webinar series continues with a focus on this question.

As the Administration begins new efforts to control greenhouse gases innovative technologies are opening the possibility for carbon emissions to become a business opportunity. Several ABO member companies are closing in on the commercial production of biofuels, feeds, fertilizers and other products derived from algae. Algae are voracious consumers of CO2, and making products from algae can beneficially reuse carbon emission from a variety of sources.

In this webinar leaders from the algae industry, major energy companies, and climate policy experts will discuss how algae can transform carbon emissions into a valuable feedstock that will help our climate and improve the bottom line.

This will be an informational event for anyone that needs to understand the [illegible]

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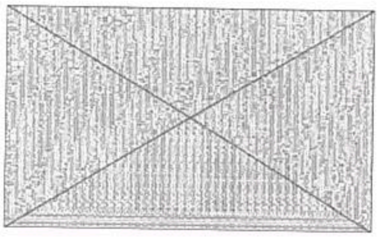

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BIOMASS & BIOENERGY

An alternative approach to indirect land use change: Allocating greenhouse gas effects among different uses of land

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abstract

Indirect land use change (iLUC) is hypothesized to occur when increasing demand for land due to bioenergy production displaces food and feed production onto new lands, thereby potentially producing large greenhouse gas emissions (GHG) during the land conversion event. Thus far, the totality of the projected iLUC effect has been assigned to biofuel production. In fact, multiple drivers of land use change exist and the resulting GHG releases should, in fairness, be allocated among these drivers. It seems more useful and intellectually rigorous to allocate potential land use change effects among these many drivers. This paper focuses on how to allocate the environmental consequences of iLUC to the multiple drivers through a function-oriented approach, namely human nutritional requirements for calories and protein. "Food versus Biofuel" issues can then be more usefully addressed as "Nutrition versus Biofuel" issues. Human beings actually have many choices in how we provide ourselves with adequate diets, and these choices have very different GHG and land use consequences. Therefore, in this paper, GHG assigned to iLUC is allocated between ethanol and human dietary preferences via a human nutrition-based method. Applying allocation approaches to iLUC lowers the estimated GHG of iLUC by up to 73% compared to GHG estimates in the GTAP model. For example, global warming intensity (GWI) of ethanol measured as CO_2 equivalent becomes 58.2 g MJ $^{-1}$, while GWI of ethanol calculated using GREET is 68.9 g MJ $^{-1}$.

1. Introduction

Using crops as feedstocks for biofuel production has created mixed reactions. Biofuel advocates believe that biofuels can help mitigate global climate change and regard biofuels as more sustainable alternatives to petroleum based fuels. Others claim that biofuels do not mitigate global warming and in fact, release more greenhouse gas (GHG) emissions than petroleum based fuels due to indirect land use change (iLUC). Many prior studies show that GHG emissions associated with iLUC are a major greenhouse gas source in the corn-based ethanol fuel system [1e4]. Global agricultural economic models have been used to project the magnitude of iLUC resulting from the land conversion

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events catalyzed by the diversion of grain to U.S. ethanol production [3e7].

A primary relationship expressed by iLUC estimates is the apparent conflict between food production and fuel production due to our land use choices. According to iLUC, coarse grains would be planted to replace the crops "lost" due to biofuel production [8]. Coarse grains are used as human food, animal feeds and for other purposes. Most coarse grains (62%) are used globally as livestock feeds, while about 34% of coarse grains are used as human food, seed, and for non-food purposes [9]. The remainder (4%) of coarse grains produced ends up in various residue streams that are not utilized for productive purposes (referred to as "unused residue").

We assume that coarse grain produced in the newly converted croplands due to iLUC follows the same patterns of the current usage of coarse grain. Thus two questions arise from a thoughtful consideration of these data:

1. 'Should biofuel production be held responsible for the environmental consequences of the newly converted croplands for coarse grain production that ends up in unused residue ("waste") streams?' It seems more reasonable and more useful to assign these consequences to crop supply chain management rather than to biofuel production, which has little or no influence on supply chain decisions for coarse grains.
2. "Should biofuel production be held responsible for lifestyle food choices or, instead, for the effect of biofuel production on the supply of basic human nutrients?" As mentioned previously, about 62% of coarse grain produced in the newly converted croplands will be used as animal feed to produce animal-based foods. Since life cycle assessment is a function-oriented tool, the main functions delivered by animal-based food could be defined as nutrition and taste. From a functional perspective, biofuel production could reduce the global supply of nutrients so that forest or grassland elsewhere would be converted to croplands to replace the nutrients lost due to biofuel production. Vegetable-based alternatives for current animal-based foods are available. The American Dietetic Association states that these plant-based alternatives can provide nutrition equal to that provided by animal-based foods [10]. The choice between animal-based foods and equally nutritious alternatives is therefore a personal decision that depends on individual and socio-cultural characteristics (dietary preferences) [11]. If this line of reasoning is followed, we can conclude that biofuel production is not responsible for food choices, but only for the nutrients lost when crops are diverted to biofuel production.

From this nutritionally-based perspective, biofuel production should take full responsibility for the environmental consequences of the converted croplands involved in producing food for direct human consumption, for seed production and for other non-food purposes, and in producing the basic nutrients lost to biofuel production, but not for animal feed production, which is a food preference rather than a true nutritional requirement. Thus the remaining issue is how to allocate the environmental consequences of iLUC associated with the converted croplands for animal feed production between biofuels and dietary preferences.

We suggest here a method for allocating GHGs "caused" by iLUC between biofuels and dietary preferences. The GWI of corn grain-based ethanol resulting from calculations by the GREET model [5] is used as a reference value. The GREET model uses results from the GTAP (Global Trade Analysis Project) model to determine natural ecosystem conversions over different time periods corresponding to ethanol production increases in the United States [6]. The weighted average GHG measured as CO_2 equivalent due to iLUC is 14.5 g MJ^{-1}, and the resulting GWI of ethanol fuel is 68.9 g MJ^{-1}.

2. Material and methods

The environmental consequences of iLUC associated with croplands, particularly for animal feed production, are allocated between biofuels and dietary preferences. Global level mass or economic allocation approaches are probably not appropriate for this allocation because of the difficulty in relating these physical measures to intensely personal and cultural dietary preferences.

One feasible approach to this allocation is a function-oriented method, in which U.S. ethanol is "responsible" for GHG emissions due to iLUC associated with producing nutrients lost due to U.S. ethanol production regardless of the origin of these nutrients e whether vegetable or animal-based. The major nutrient from livestock production is protein (neglecting the micro nutrients also available in animal-based foods). Even though supplements for some micro nutrients (e.g., calcium, vitamin B12) might be needed for vegetarian diets [9], these supplements are ignored in the analysis because land requirements for producing these supplements can not be estimated at this time due lack of information. Furthermore, these supplements are consumed at very low levels and are produced via a fermentation process, in which land uses would probably be insignificant. The function delivered by vegetable-based protein is therefore equivalent to the functions delivered by animal-based protein in terms of nutritional perspectives [9]. (Price competition between vegetable- and animal-based proteins is ignored in this analysis.)

The underlying assumptions in this approach are that: 1) livestock provides protein to human beings, and 2) the choice between vegetable- and animal-based proteins depends on dietary preferences. Therefore, GHGs resulting from iLUC associated with the converted croplands producing human foods, seeds and non-food items, together with the croplands required to produce vegetable-based protein are assigned to U.S. ethanol fuel production. This is illustrated in Fig. 1. The bars in the second column in Fig. 1 represent the converted croplands due to iLUC, and the appropriate colors denote the purposes for which these coarse grains are produced in the converted croplands, including: animal feed, human food, seed and non-food uses, and likely losses to unused residue streams. For example, about 68% of the converted croplands in the United States are used in animal feed production, while 32% of the converted croplands are involved in producing coarse grain for human food, seed and non-food purposes. The bars in the third column in Fig. 1 represent croplands

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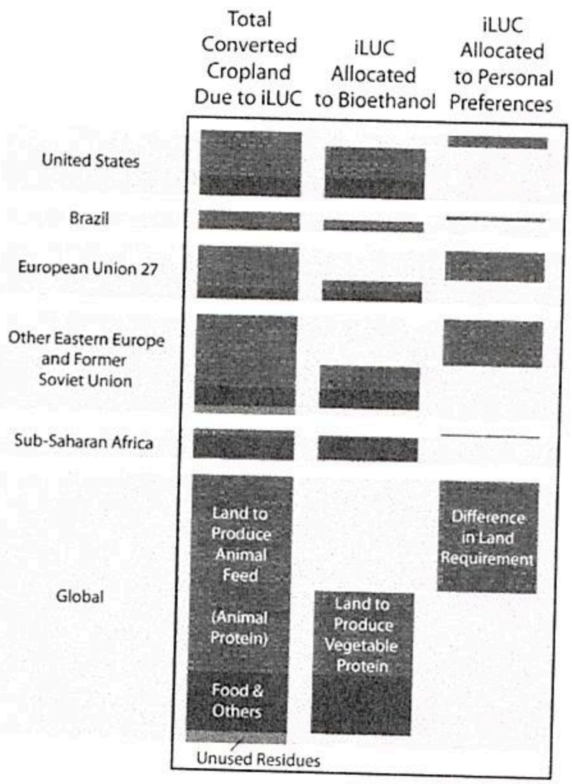

Fig. 1 e Allocation between biofuel and dietary preferences [light green bar: croplands for animal feed production; blue bar: croplands for producing crops for human food, seed and non-food purposes; red bar: croplands for producing crops flowing to unused residue streams; dark green bar: croplands for producing vegetable nutrient alternatives; the height of bar is proportional to the amount of the converted croplands]. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

required to produce vegetable alternatives equivalent to animal-based food in terms of nutrient quantity. The bars in the last column denote the converted croplands allocated to ethanol fuel, including croplands for coarse grain production for human food, seed and non-food purposes and croplands for alternative nutrient production (vegetable-based).

Results from the GTAP model [6] are used to determine the effects of allocation between biofuels and dietary preferences on the GHG due to iLUC. The GTAP model [6] shows that the 1065 PJ (50 hm^3) of corn grain-based ethanol production increase from 2001 to 2015 would convert 17,233 km^2 of natural ecosystems to croplands in the 19 global production regions considered, including reverse conversion (from crop land back to unmanaged land) of 8075 km^2. Note that effects of the co-product (distillers grains) are already accounted in the GTAP model [6]. In this analysis, the reverse conversion is assumed to be split between the different fractional uses of coarse grains, implying that the crop supply chains also influence the reverse conversion processes.

Coarse grains would be planted in the newly converted croplands to produce crops for food, seed and non-food purposes, and as animal feeds for swine, broiler, layers, cattle, dairy cows, mutton and goat. We assume that coarse grains are always involved in feeding swine, broiler, layers and farm raised fish, and only involved in industrial feeding systems (concentrated animal feeding operations) for cattle, dairy, mutton, and goats. No coarse grains are used to feed cattle, dairy cows, mutton, and goats in other systems (i.e., grazing and mixed farming systems). Animal-based proteins resulting from beef, sheep, goat, pork, poultry, milk, farm raised fish, and eggs are of interest in this human nutrition-based method.

Based on regional historical data [9], only 22% of total converted croplands (3814 km^2) would be used for human food, seed, and non-food purposes, while about 12,654 km^2 of the converted croplands would be used in producing animal feed when the 1065 PJ increase in ethanol production induces iLUC (17,233 km^2 of natural ecosystems converted). Coarse grains produced in about 765 km^2 of the converted croplands would flow to various unused residue streams.

To determine animal-based protein yields with respect to croplands for animal feed, non-region specific feed conversion ratios (FCR) for each livestock type [12e16] are used. No regional information on feed conversion ratios is currently available. The fraction of each type of animal-based protein derived from animal feed produced in the converted croplands is based on average regional livestock production from 2001 to 2007. The converted croplands used for producing animal feed (12,654 km^2) would produce 0.20 Tg of animal-based protein. Thus, U.S. ethanol production would assume full "responsibility" for the converted croplands required to produce 0.20 Tg of protein regardless of the origin of that protein. The conceptual diagram for this procedure is illustrated in Fig. 2.

3. Results

In order for humans to obtain all of their essential amino acids from vegetables, it is necessary to eat complementary protein sources, grains and legumes (pulses, soybeans, etc.). In this study, pulses and soybeans were selected as the sources of the vegetable-based protein alternative to animal-based protein. It was assumed that all of the grain amino acid requirements were allocated within the stream that included human food, seed, and non-food purposes. If protein from pulses (e.g., beans, peas, chickpea, etc.) is selected as vegetable-based protein in the allocation procedure about 5431 km^2 of these croplands are required to produce the same quantity of protein formerly obtained from livestock (0.20 Tg). About 5431 km^2 of the converted croplands are therefore the minimum required to produce protein lost (0.20 Tg) due to U.S. corn grain-based ethanol fuel production. Corn grain-based ethanol is therefore "responsible" for the converted croplands required for human food, seed, and non-food purposes (3814 km^2), and for producing protein (5431 km^2), or a total of 9246 km^2 of converted croplands, 57% less than that resulting from the GTAP model [6]. This case is referred to as EtOH_A. The difference in the converted croplands between animal-based and

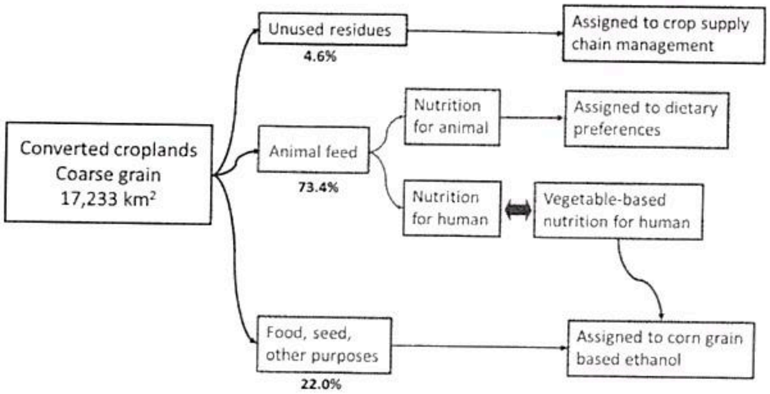

Fig. 2 e Conceptual diagram for the assignment of converted croplands to corn grain-based ethanol.

vegetable-based protein production (7222 km^2) is assigned to dietary preferences. Crop supply chain management is responsible for the converted croplands for crops ending up in the unused residue streams (765 km^2). The detailed results are summarized in the Supplementary material.

If both pulses and soybeans are involved in producing vegetable-based protein in the allocation procedure, about 3205 km^2 of the converted croplands are required to produce the same amount of animal-based protein lost due to U.S. corn-based ethanol fuel production. The fraction of croplands planted to either pulses or soybeans is based on the regional trends [8], summarized in the Supplementary material. U.S. corn grain-based ethanol production would thus be "responsible" for 7019 km^2 of the converted croplands. Planting both pulses and soybeans as protein sources requires less crop land than planting only pulses does because soybeans have higher protein yield per acre than pulses. This case is referred to as EtOH_B.

If vegetable-based protein is equivalent to only animal protein from meat (i.e., red meat and white meat), about 11,874 km^2 of the converted croplands are assigned to U.S. corn grain-based ethanol fuel production. The assigned converted croplands include 3820 km^2 for vegetable-based protein production, 3814 km^2 for human food, seed, and non-food purposes, and 4239 km^2 for animal feed for milk and egg production. This case is referred to as EtOH_C.

The breakdown of these croplands is illustrated in Fig. 3. 'Food' in Fig. 3 represents the converted croplands for human food, seed and non-food purposes, and 'Wastes' represents the converted croplands whose products flow to unused residue streams. 'Meat' is the converted croplands for animal feed used to produce protein in meat, while 'Milk & egg' is the converted croplands for animal feed used in producing protein from milk and egg. 'Vegetable-based protein' represents the croplands for producing vegetable-based protein. In the GTAP model, all the converted croplands are assigned to ethanol production (i.e., croplands for human food, seed and non-food purposes, for meat production, for milk and egg production, and for wastes). In EtOH_A and EtOH_B, ethanol production is responsible for the converted croplands for human food, seed and non-food purposes, and for vegetable-based protein production. Ethanol production in EtOH_C is responsible for the converted croplands for milk and egg production along with the assigned converted croplands in EtOH_A (or EtOH_B). Results of sensitivity analyses on other aspects (e.g., feed conversion ratios, farming systems, etc.) are summarized in the Supplementary material.

GHG associated with iLUC can be estimated based on the converted croplands assigned to U.S. ethanol fuel production. Allocated GHG of iLUC assigned to ethanol fuel measured as CO_2 equivalent ranges from 3.9 to 8.6 g MJ^{-1}, about 27e60% of

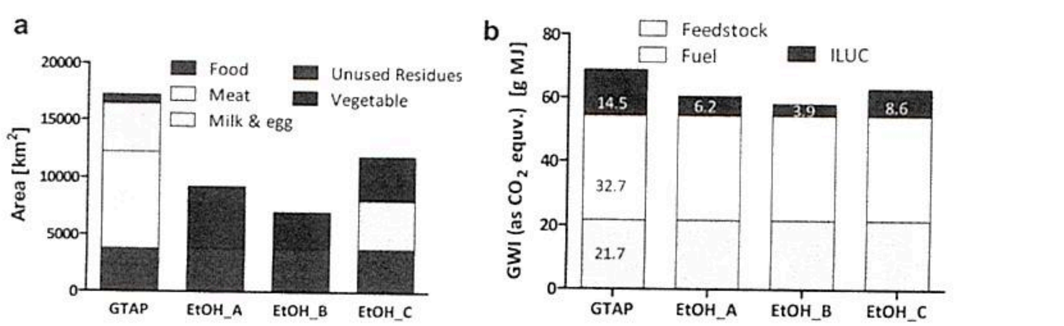

Fig. 3 e Land use change and global warming intensity: (a) assigned converted croplands to ethanol for 1065 PJ of ethanol production increase and (b) GWI of ethanol fuel.

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the value in GTAP (14.5 g MJ $^{-1}$). The specific types of vegetable-based protein employed greatly influence GHG due to iLUC. Thus the vegetable species involved in producing protein are critical to the GHG allocation between biofuels and dietary preference.

When GHG of iLUC is assigned to ethanol and human dietary preferences via a human nutrition-based method, GWI of ethanol fuel measured as CO_2 equivalent ranges from 58 to 63 g MJ $^{-1}$, 8 5e91% of GWI in the GTAP model. Results are given in Fig. 3.

4. Discussion and conclusions

As with other analyses connected to iLUC, these results are likely to prove controversial. However, it seems obvious that human beings choose to use land in various ways to meet our needs, including production of food and feed. We now face an additional choice related to our use of land: how to best use it to provide some energy services. In particular, the authors know of no way to have a sustainable transportation sector without liquid fuels derived from plant biomass. It is simply impossible for some transportation services (e.g., aviation, ocean shipping, heavy trucking, etc.) to be met with battery-operated vehicles. Therefore, we must have sustainable liquid fuels, and that means sustainable fuels from plant biomass. Thus we must first envision, then design and implement land efficient and environmentally sustainable biofuel systems. For example, we might grow double crops in conjunction with corn and soybean production, thereby reducing greenhouse gases, increasing soil fertility and reducing nitrate losses to ground and surface water while producing very large amounts of biofuels [17]. In the meantime, we need to think clearly and rationally about these complex issues surrounding land use choices. As pointed out [18], it does not serve us well to regard biofuels as an "aggressive intruder on an agrarian utopia", but rather as one more human need to be met by appropriate land use choices.

For this reason, we do not think that the debate around iLUC is currently framed as it should be: namely in terms of allocation among different land use change drivers, in this case between human nutritional needs and biofuel production. Perhaps the following illustration will help. Let us suppose there are two different vehicles available for consumers e one with high fuel economy and another with low fuel economy. Obviously, the GHG emissions associated with operating these two different vehicles are quite different. If a consumer chooses the low fuel efficiency vehicle, then he/she is also choosing the higher GHG emissions associated with that vehicle, and therefore it is the preferences of that consumer, rather than the fuel producer, that are "responsible" for the higher GHG emissions. In contrast, according to current practices in iLUC, fuel producers rather than consumers are made responsible for the very different GHG consequences of land use choices based on consumers' nutritional preferences. We believe this is unreasonable and inequitable. Also, this approach does not lead to the most well-informed societal decisions about how to use land to meet human needs for both nutrients and biofuels.

In the same way, in this paper we have tried to illuminate how estimated GHG emissions due to iLUC are affected by dietary choices. We attempt to allocate GHG emissions due to iLUC based on the consequences of various dietary choices. Since there is no single scientific method for allocation to represent multi-processes, there can be no unique estimate for GHG emissions due iLUC resulting from the production of corn-based ethanol or other biofuels.

Previous estimates of iLUC result from a global economic model that is based on livestock nutrition. In other words, the human dietary preferences remain unchanged during these simulations. We recommend instead a human nutrient-oriented global economic model to determine the magnitude of the potential natural ecosystem conversions. Even though price competition between vegetable-based and animal-based proteins is ignored in this analysis, price competition should be included in future analyses, embedding the price competition in the economic models. Other uncertainties in these calculations arise from factors such as feed conversion ratios, farming systems used, the exact sources of vegetable-based protein and so forth. In particular, regionally specific feed conversion ratios and farming systems need a great deal of attention.

Acknowledgments

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Appendix A. Supplementary data

Supplementary data related to this article can be found online at http://dx.doi.org/10.1016/j.biombioe.2012.07.015.

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To: Larson, Robert[larson.robert@epa.gov]
From: Mary Rosenthal
Sent: Mon 5/20/2013 9:53:43 PM
Subject: Algae InSight: Tackling the Big Questions

Algae InSight

Edition: May 20, 2013

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Executive Director's Report

Many of us who are closely watching the biofuels industry in general, and the algae fuel industry in particular, have been enjoying a stream of great news from ABO member companies.

In just the past few weeks, BioProcess Algae was awarded a $6.4 Million U.S. Department of Energy grant to develop advanced drop-in biofuels for military jets and ships; Heliae revealed its new algae production platform, Volaris; and new research revealed how algae can be used to produce advanced materials and aid in the fight against malaria.

In the midst of all these developments, ABO launched two new initiatives designed to track, report and dive deeper on these and the many other expected developments in the industry.

First, we produced an interactive industry map that shows algae projects, research institutions and commercial developments from coast-to-coast. A quick glance at the map makes it clear that algae is a 50-state opportunity. I've been impressed by the number and variety of research, projects and facilities under way. If you are not on the map and want to be listed, please contact us at info@algaebiomass.org and we'll take care of you.

The vast geographic spread of algae companies on the map also visually demonstrates another key attribute of algae - they can grow in a variety of climates in a variety of water sources. One of the big misconceptions about algae is that they require too much freshwater to grow, impacting their overall sustainability.

We invited three top scientists; Dr. Stephen Mayfield of the Center for Algae Biotechnology at UCSD, as well as Dr. Mark Wigmosta and Dr. Erik Venteris at the Pacific Northwest National Laboratory to present at an ABO-sponsored webinar the latest science on the biology of algae production in salt water, as well as the abundant availability of saltwater resources in the U.S.

The research from these experts was extremely detailed, well-presented, and should put to rest misconceptions that algae production will require unsustainable impacts on fresh water.

More than 100 people registered for the webinar from across the industry, the media, academia, the Department of Energy, and even Capitol Hill.

If you missed it, you can view the recorded webinar here. And keep an eye open for our next webinar.

Finally, I'd like to request that you help our industry this month with a call to your Congressional delegation in support of new legislation that could have a game changing effect on how algae projects are financed.

As you may know, many biofuel companies (including those in the algae industry) have been adept at raising early stage capital for research and development. Yet when it comes to building a facility - a highly capital intensive effort - many biofuels companies find the expense is considered too high for traditional venture capital and too risky for traditional banks. As a result, many companies are forced to spend more time raising funds than deploying technology.

The Master Limited Partnerships Parity Act (MLPPA), recently introduced by Senator Chris Coons and a bipartisan group of co-sponsors, hopes to solve this problem.

For a company organized as a Master Limited Partnership (MLP), ownership interests are publicly traded and offer investors liquidity, limited liability and dividends-but are operated and taxed as partnerships. For years it has been primarily oil and gas companies that have benefited from the arrangement, comprising more than 90% of MLPs. This bill levels the playing field and gives renewable fuel companies the same tax treatment as their counterparts in the fossil world.

Please contact your state's Congressional delegation and tell them you support expanding Master Limited Partnership to renewable energy companies.

Help us unleash the investments we need to provide the world with the renewable fuels, fertilizers, chemicals, medicines, carbon sequestration, wastewater treatment, plastics, and the many other innovations algae can provide.

Thank you, and keep up the good work!

Sincerely,

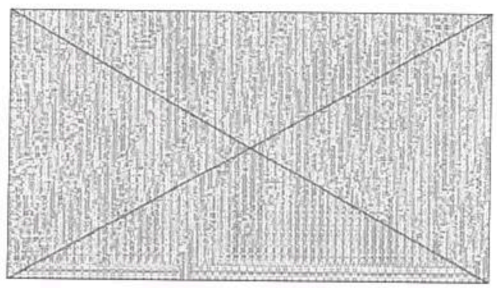
Mary Rosenthal

Executive Director, Algae Biomass Organization

The Algae Industry Map

A new map of the algae industry published online by ABO shows algae production facilities and research projects stretching from coast to coast, illustrating a nationwide opportunity for a new and growing industry that is moving to supply the U.S. with algae-derived renewable fuels, feeds, fertilizers, chemicals and other products.

Since first publishing this map we have received great positive feedback and requests from companies, universities, and others to be included. If you are an ABO member or organization with a project or major milestone that needs to be represented on this map contact us today!



Legislative Update: MLP's and the Farm Bill

Master Limited Partnerships: With the introduction of the Master Limited Partnerships Parity Act (MLPPA), Senator Chris Coons and a bipartisan group of co-sponsors hope to accelerate the commercialization of the next generation of domestically-produced, sustainable fuels.

The timing couldn't be better for the algae industry, and we urge algae supporters to contact their representatives in Washington, DC and show them the wide range of support this bill has.

The Farm Bill: Congress is moving on the Farm Bill again this month. ABO will keep you updated on the latest developments, but our principal priority is to make sure the bill's energy title is properly funded. Mandatory funding for the energy title will make sure that programs such as the Rural Energy For America Program, the Biomass Crop Assistance Program, the Biorefinery Assistance Program and the Biobased Markets Program can be effective.

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jginus@sciknow.org

New Members

Member News

[Matrix Genetics Emerges from Algae Biofuels Wilderness With a Partner]

[BioProcess Algae Awarded $6.4 Million U.S. Department of Energy Grant to Develop Advanced Drop-in Biofuels for Military Jets and Ships]

[How United Airlines plans to save 85 million gallons of fuel this year]

[NMSU researcher looks to use algal co-product as protein in animal feed]

Industry News and Development Companies Join Forces

Heliae Reveals Volaris - Algae Production Platform

Research advances in conversion of wastes and algae to crude oil

Could a greener military prove more powerful?

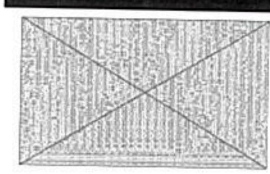
"Algae-powered" building opens in Germany

Conservatives Come Out for Renewable-Energy Projects

Renewable Energy Wins Republicans Backing Oil-Gas Benefit: Taxes

Science on the South Lawn

Join ABO



As we continue to promote the development of commercial markets for sustainable products derived from algae, we invite you to join us in our efforts by becoming a member of the Algae Biomass Organization. As the trade association for the industry, we act as a voice for the industry to the public, media and policy makers while also representing individuals and companies across the value chain. As an ABO member, you'll have access to a wide range of services and information, including:

- Representation in ABO's policy initiatives with policy makers in Congress and at key federal agencies, including the USDA, EPA and DOE;
- Regular industry updates and issue alerts via member-only communications;
- Opportunity to participate in ABO committees;
- Results from our annual industry survey;
- Access and input to the ABO's Technical Standards documents;
- Participation in members-only events, webinars, briefings and networking opportunities;
- Discounted registration for ABO-hosted industry events.

For questions about membership in the Algae Biomass Organization and its benefits, please feel free to visit our website. You can also contact ABO Executive Director Mary Rosenthal at mrosenthal@algalbiomass.org, or call toll-free at 1-877-531-5512.

To: Camobreco, Vincent[Camobreco.Vincent@epa.gov]
Cc: Larson, Robert[larson.robert@epa.gov]
From: Geoff Cooper
Sent: Tue 2/19/2013 3:31:40 PM
Subject: Sugar ethanol and RINs

Vince,

We've been getting lots of questions from our member producers in the past few weeks about using beet or cane sugar to produce ethanol. As I'm sure you know, there is a strong likelihood that some quantity of surplus sugar will be purchased by USDA and sold to the ethanol industry via the 2008 Farm Bill "feedstock flexibility" program. Our members are primarily concerned with the following questions:

1. **First and foremost, will producers be able to generate RINs when using sugar?**

a. **Would the use of cane sugar result in generation of D5 RINs?** It appears the answer would be "yes," as the sugarcane ethanol pathway in the regulation's look-up table does not specify the origin (i.e., "Brazil" or "imported") and it allows "any" fermentation process. Further, discussion of sugarcane in most of the pre-amble appears not to distinguish between U.S.-produced or foreign-produced sugarcane. Finally, the pre-amble remarks: "As discussed in the NPRM, other potential advanced biofuels could include for example, U.S. domestically produced sugarcane ethanol, biobutanol, and biogas."

b. **How would ethanol from beet sugar be treated?** We understand there is no pathway for ethanol from sugar beets currently in the regulation. Is EPA working on such a pathway? Or is there a case to be made that beet sugar acquired via the feedstock flexibility program might qualify as "separated food waste" under the existing pathway? The sugar beets producing the surplus sugar clearly were not grown for the express purpose of making ethanol; rather, they were grown for the food market. However, given the large surplus and the lack of a market for this extra sugar, excess sugar stocks might otherwise be treated as waste.

2. **Is there a way to expedite re-registrations/P.E. reviews so that ethanol plants registered to process corn may also process sugar?**

3. **Is EPA planning to publish ay guidance on these issues, given that many corn ethanol producers are expressing interest in the prospect of using sugar via the feedstock flexibility program?**

As always, thanks for any insight and assistance you can share.

Best regards,

Geoff Cooper

Vice President, Research & Analysis

Renewable Fuels Association

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To: Larson, Robert[larson.robert@epa.gov]
From: Algae Biomass Organization
Sent: Mon 4/20/2015 6:06:09 PM
Subject: Algae InSight: Algae Sees Profit Where Others See Costs

Algae InSight

Edition: April 20, 2015

In This Issue

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